Astoria-Broadway Capacity Study

May 5, 2022

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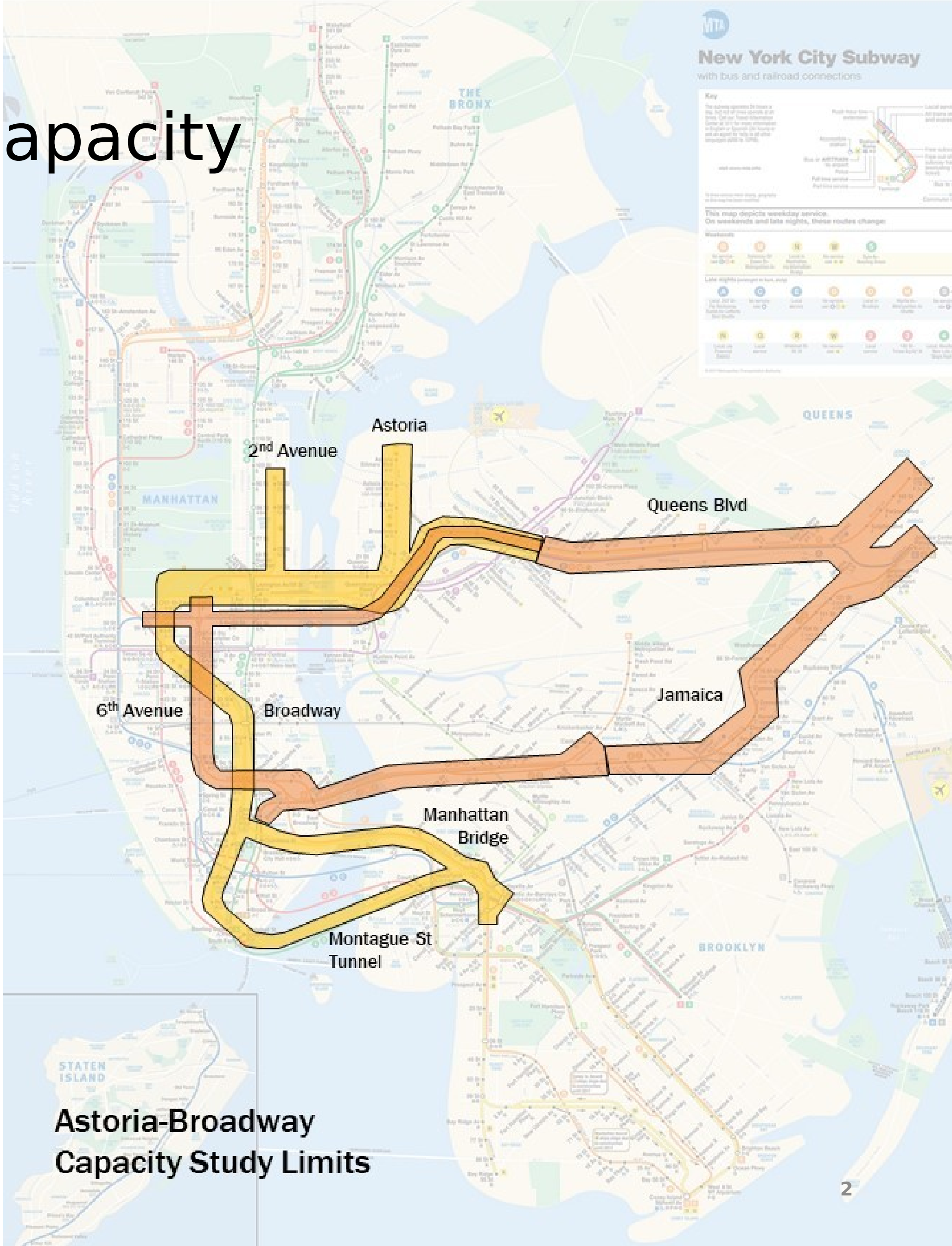
NYMTC

Astoria-Broadway Capacity Study

Overview

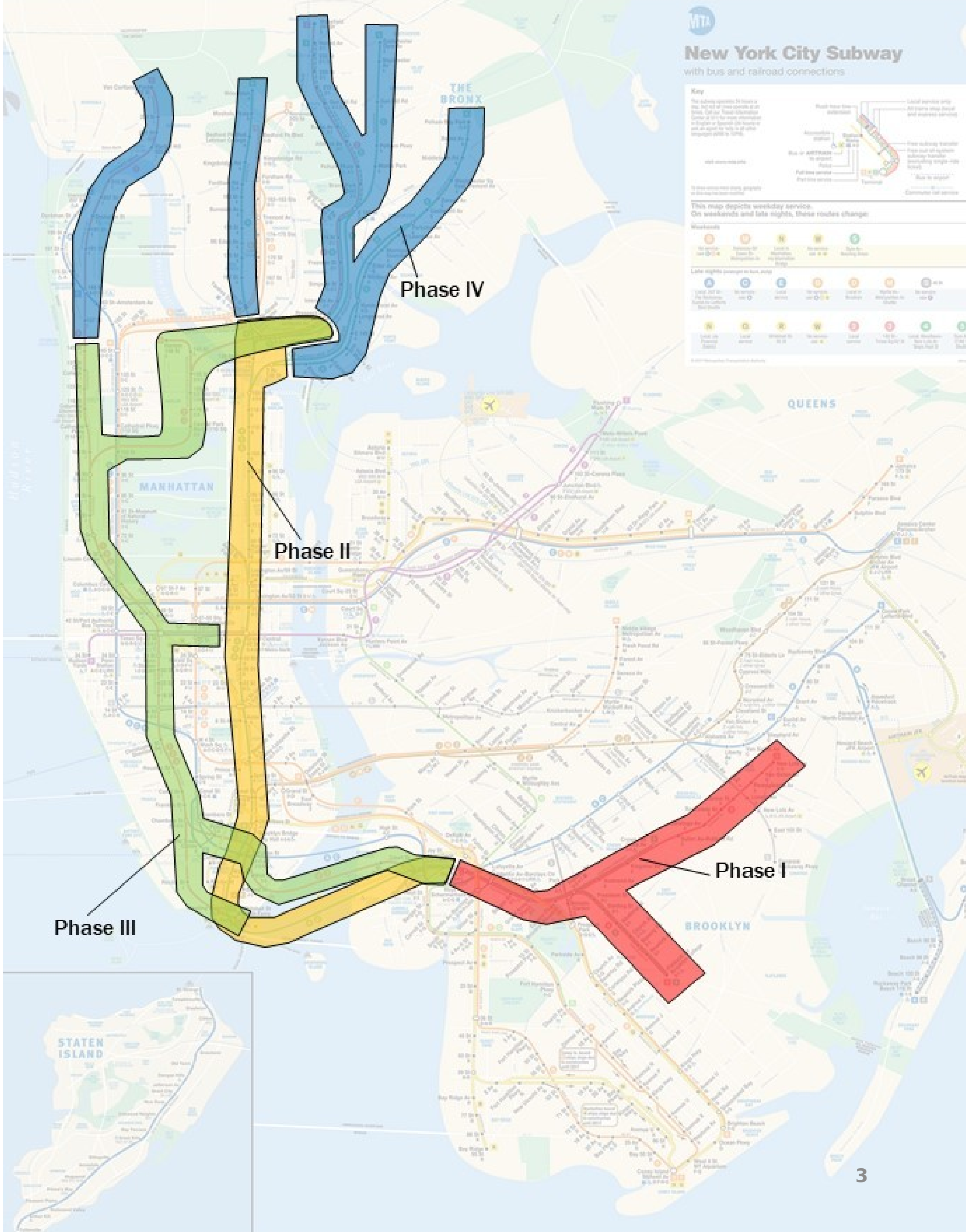
- Funded by NYMTC
- Consultant team STV and Hatch LTK
- Analyze capacity under legacy wayside and future CBTC signal systems
- Identify bottlenecks and evaluate potential improvements
- Rail operations simulation model



Astoria-Broadway Capacity Study Limits

Background

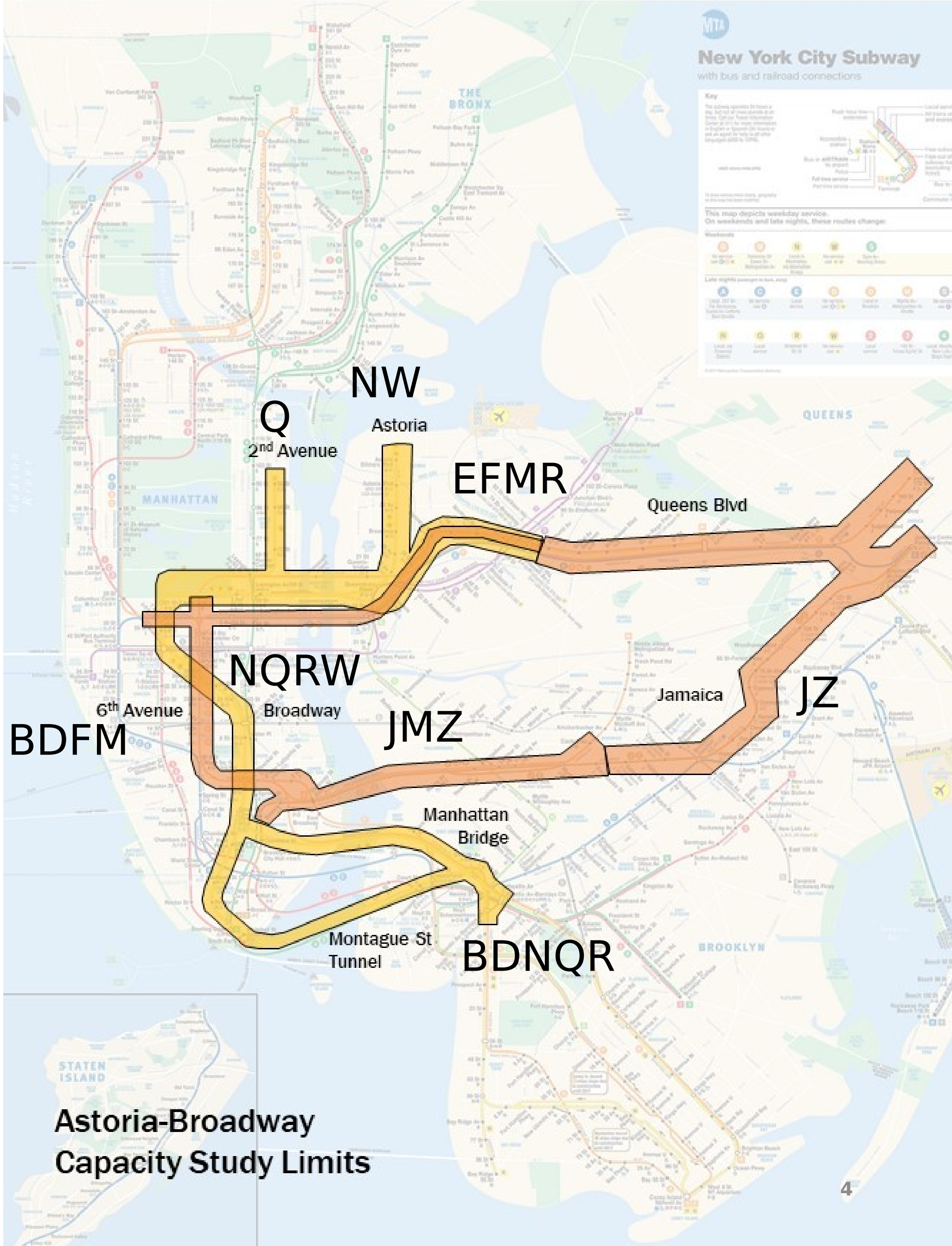
- Part of a larger systemwide study process
- NYCT’s second capacity study following completion of the IRT Capacity Study in 2020
- Analyzed capacity and bottlenecks on 1 through 6 lines and 42nd Street Shuttle
- B Division Phase II Capacity Study begins this year



Line facts

- Astoria, Broadway, 6th Av, Queens Blvd, Jamaica lines

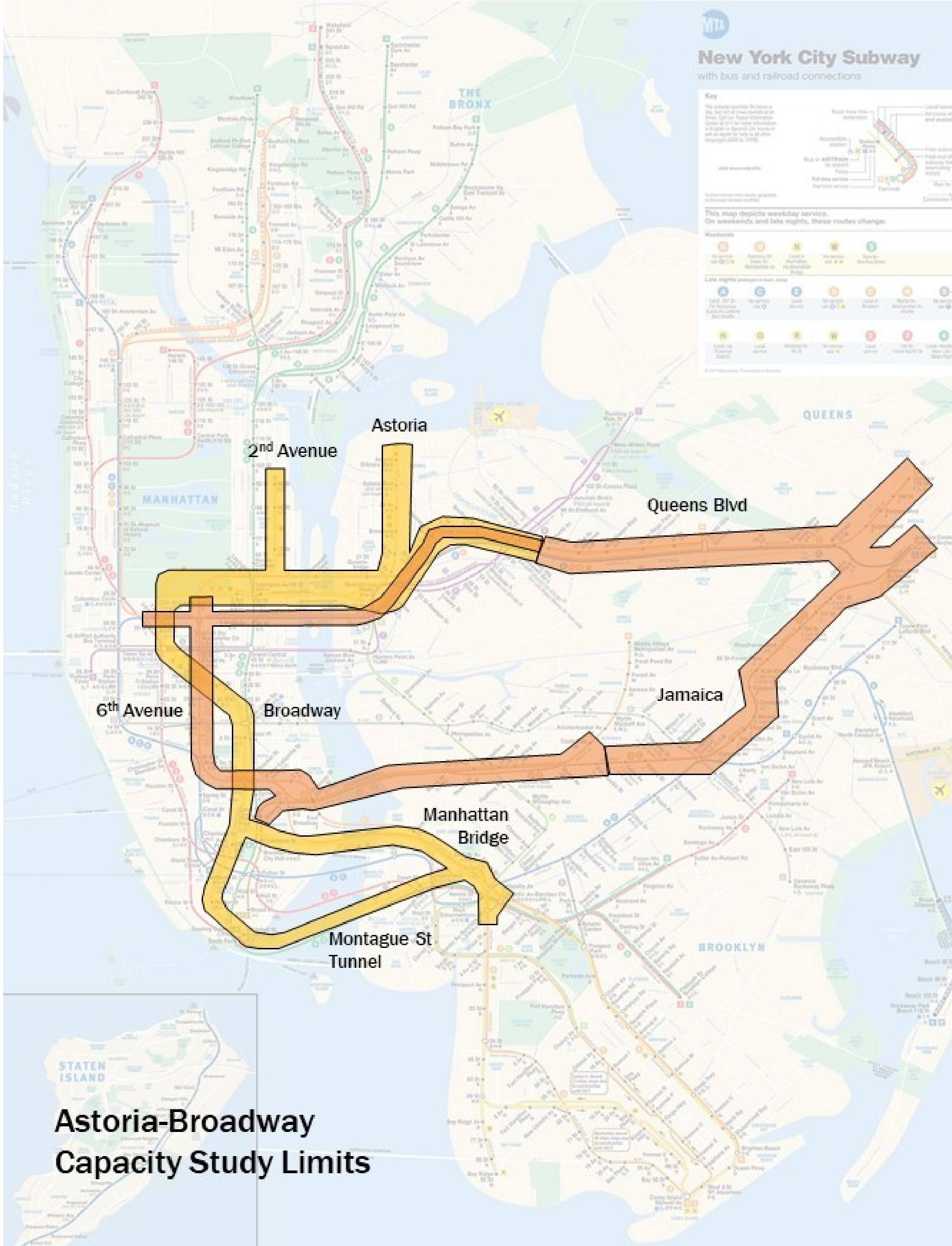
Route	Number of stations	Typical weekday ridership (Oct 2019)
B	27	325,000
D	36	400,000
E	22	525,000
F	45	600,000
JZ	30/21	200,000
M	36	350,000
N	28	350,000
W	23	175,000
Q	29	425,000
R	45	425,000



Astoria-Broadway Capacity Study Limits

Rail simulation model

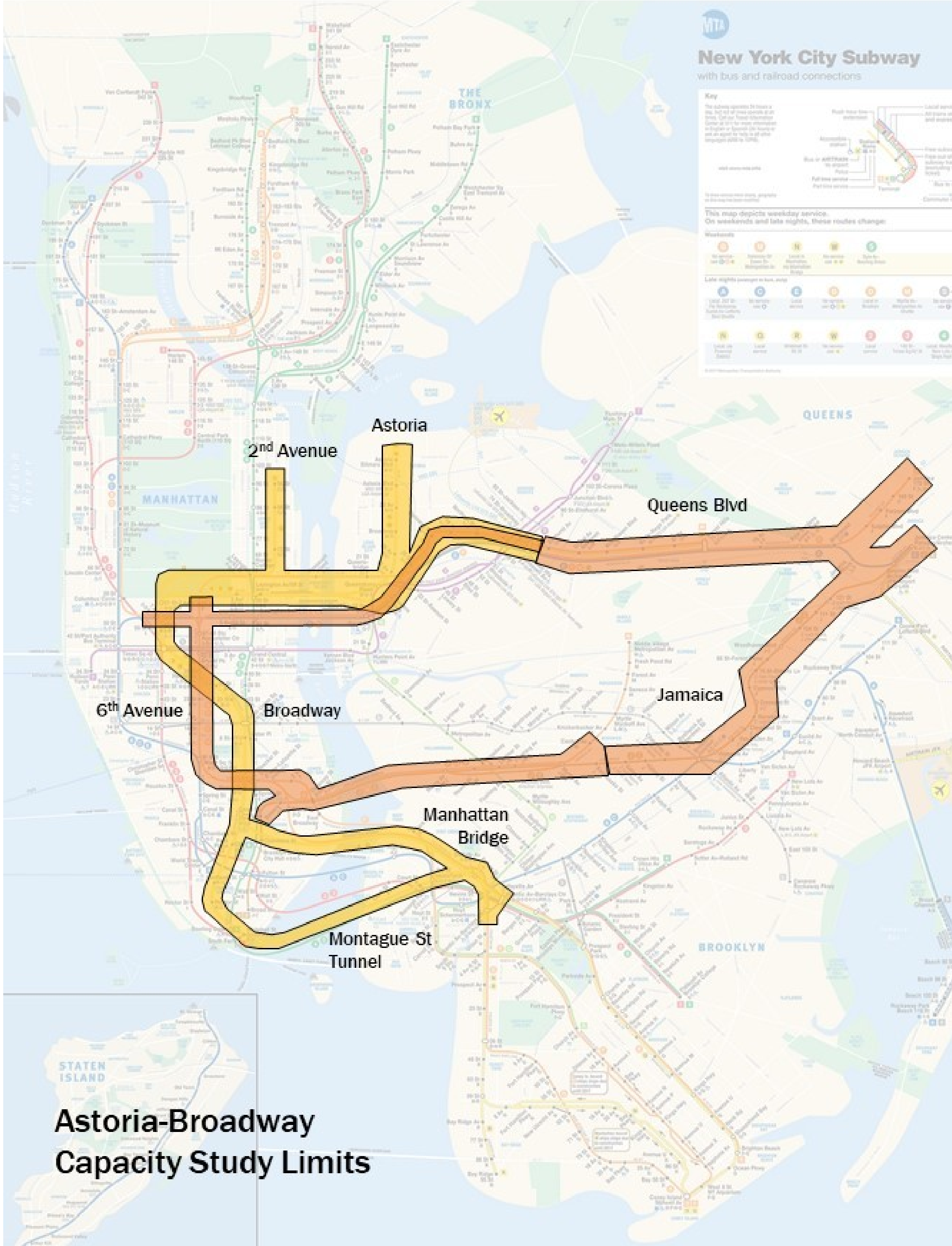
- TrainOps software replaces older RailSim
- Further development of the agency's rail simulation model for internal modeling and analysis work
- Used for service planning, analyzing service changes and planned construction



Astoria-Broadway Capacity Study Limits

Current and future signal systems

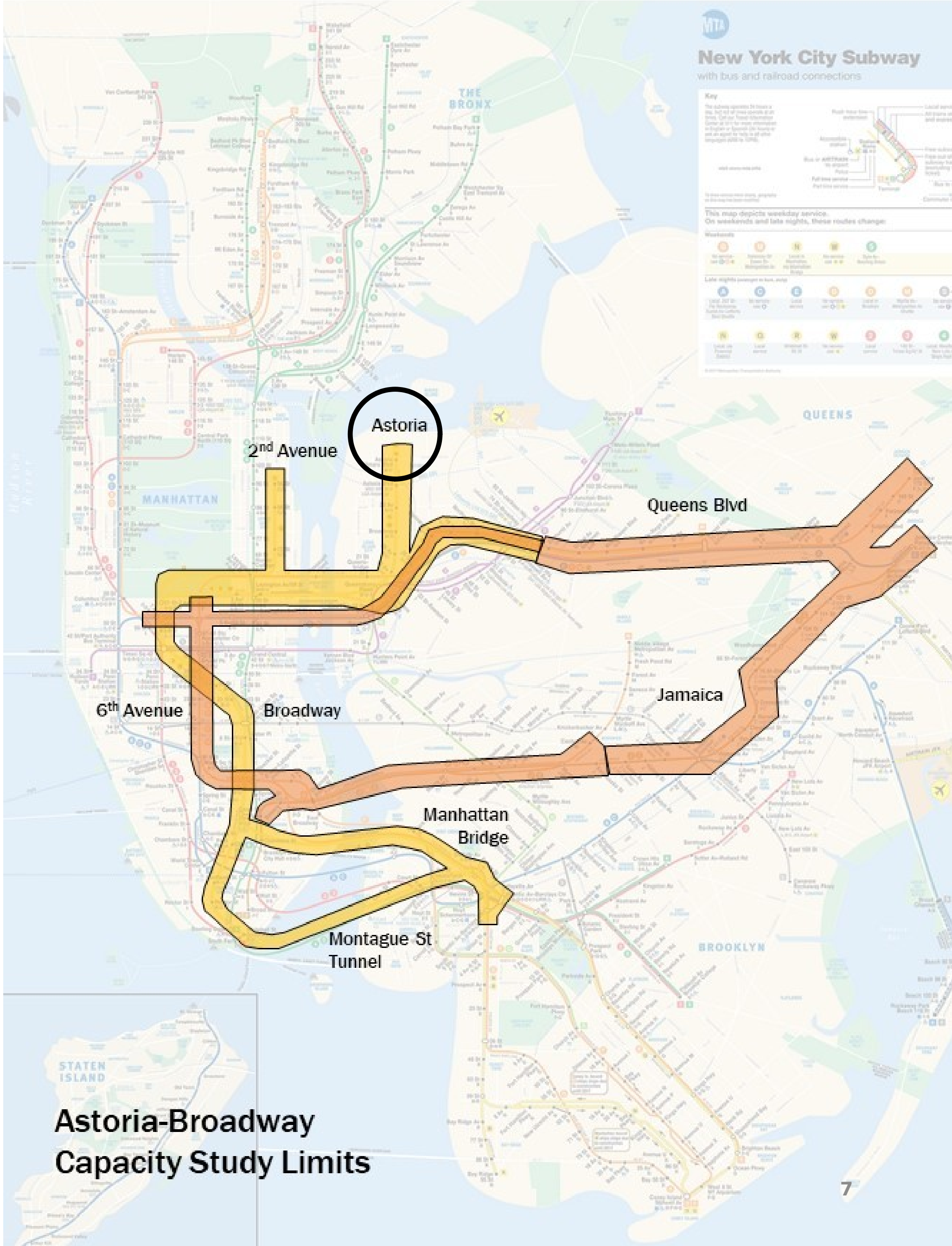
- Incorporates legacy wayside and future Communications-Based Train Control (CBTC) signal systems
- Analyzed maximum capacity and constraints under both systems
- Allows for modelling service scenarios as CBTC technology is implemented across the system



Astoria-Broadway Capacity Study Limits

Bottlenecks and improvements

- Analysis of major constraints, such as Astoria-Ditmars Blvd terminal
- Analysis of capacity constraints and future improvements
  - Astoria-Ditmars Blvd NW



Astoria-Broadway Capacity Study Limits

Astoria-Ditmars Blvd constraints

- Pre-pandemic, the Astoria Line operated near track and passenger capacity during the morning rush (15 tph)
- Post-Covid, ridership on the Astoria Line is expected to recover and resume growth by 2035
- Increasing service requires alleviating terminal constraint

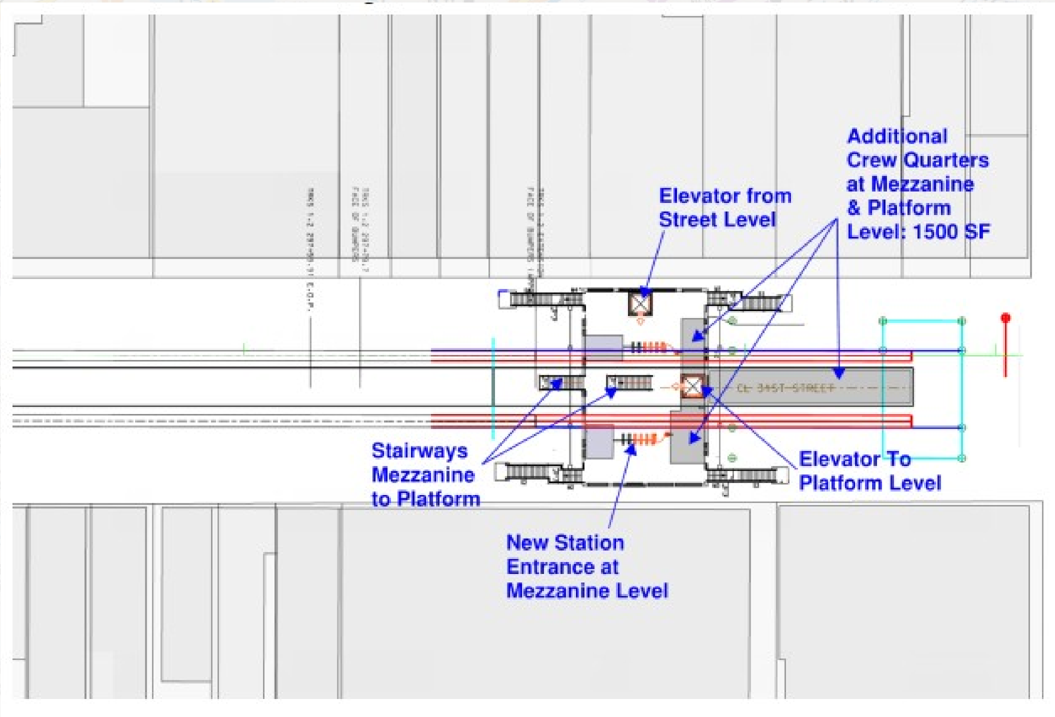
Alternatives for Astoria-Ditmars Blvd terminal

- 7 alternatives to improve capacity on the NW analyzed, modeled and compared
- Analyzed alternatives under legacy wayside and future CBTC signal systems
- CBTC alone without other improvements boosted capacity to 30 tph

Alternatives for Astoria-Ditmars Blvd terminal

Overrun track improvements

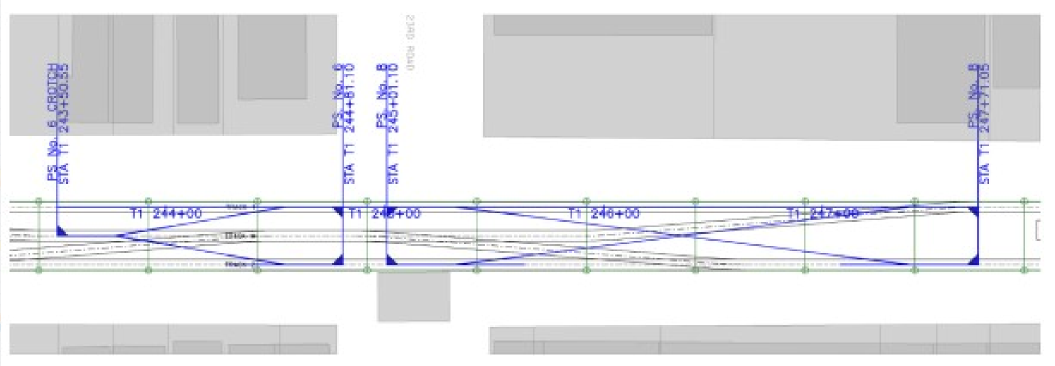
- Extend overrun tracks north by 150’ beyond the platform (~30’ currently)
- Minor gain in service capacity
- Negative community impact

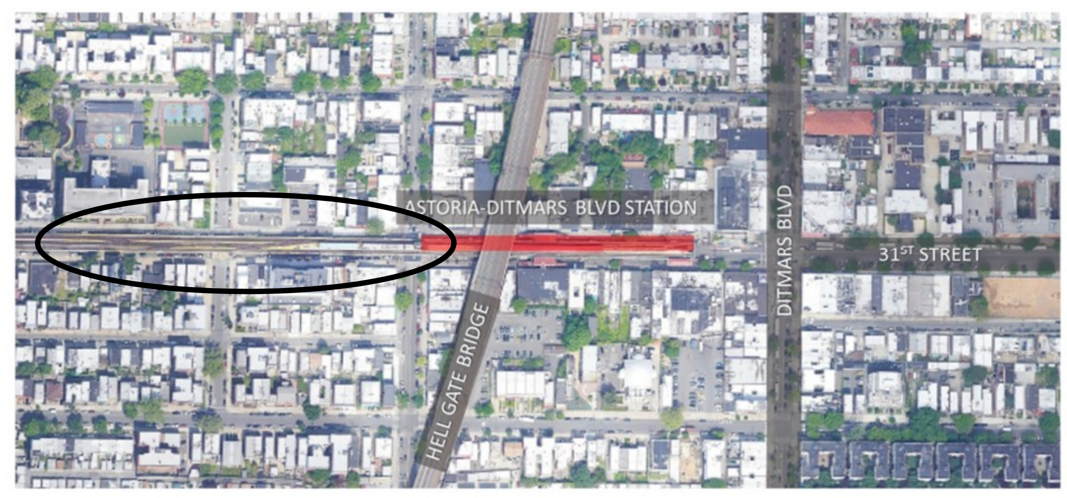

Additional Crew Quarters at Mezzanine & Platform Level: 1500 SF
Elevator from Street Level
CL 31ST STREET
Stairways Mezzanine to Platform
Elevator To Platform Level
New Station Entrance at Mezzanine Level

Alternatives for Astoria-Ditmars Blvd terminal

New or reconfigured interlockings

- Existing track interlocking is long and takes a long time to go through it
- Analyzed a new track interlocking configuration
- No capacity gains under wayside
- CBTC performs better with existing





Alternatives for Astoria-Ditmars Blvd terminal

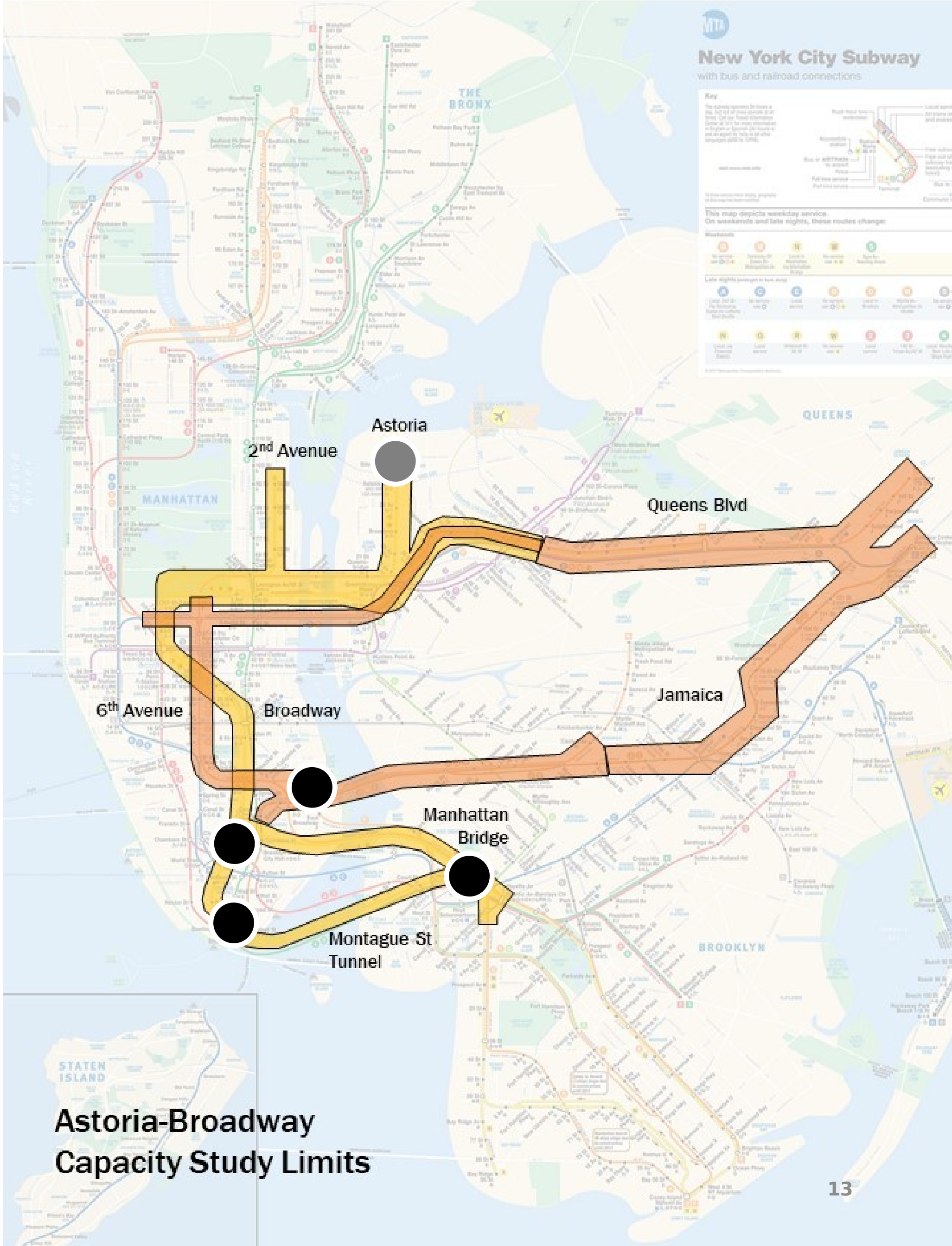
Conclusion

- Multiple terminal capacity micro-simulations found significant gains under CBTC
- CBTC alone provides a gain in capacity to 30 tph from 15 tph currently under wayside
- No ridership forecast or capacity to go up to 30 tph because of shared lines on the Broadway Line

Platform at Astoria-Ditmars Blvd.

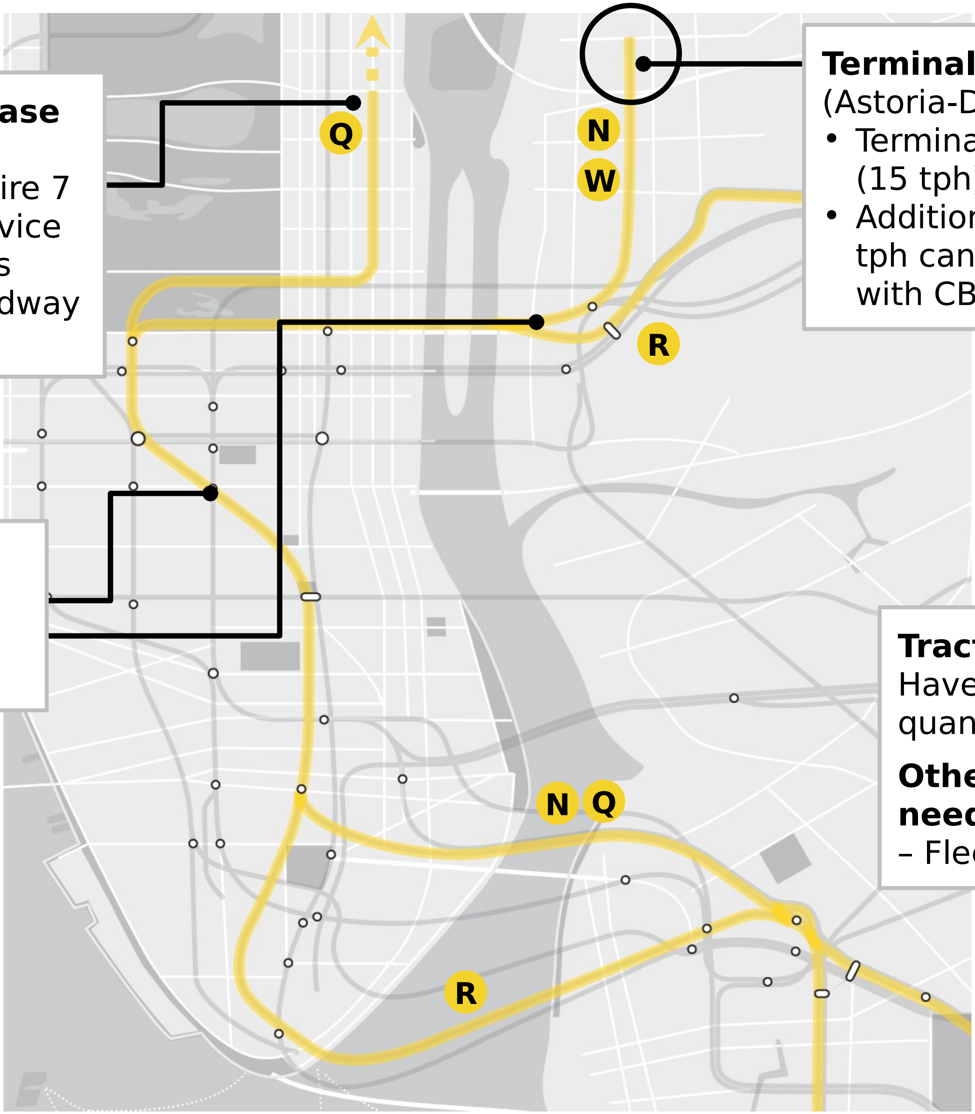
Other areas analyzed

- City Hall lower level
- Delancey St-Essex St
- DeKalb Av/Gold St interlocking
- Whitehall St



Astoria-Broadway Capacity Study Limits

Astoria-Broadway BMT: Existing constraints are relieved by capacity gains achieved with future CBTC



Second Ave Subway Phase 2
- SAS is projected to require 7 additional peak tph (service plan TBD) by late 2020’s
- Trains must run on Broadway south of 57 St

Terminal capacity (Astoria-Ditmars Blvd)
- Terminal is near capacity (15 tph)
- Additional capacity to 30 tph can be achieved with CBTC

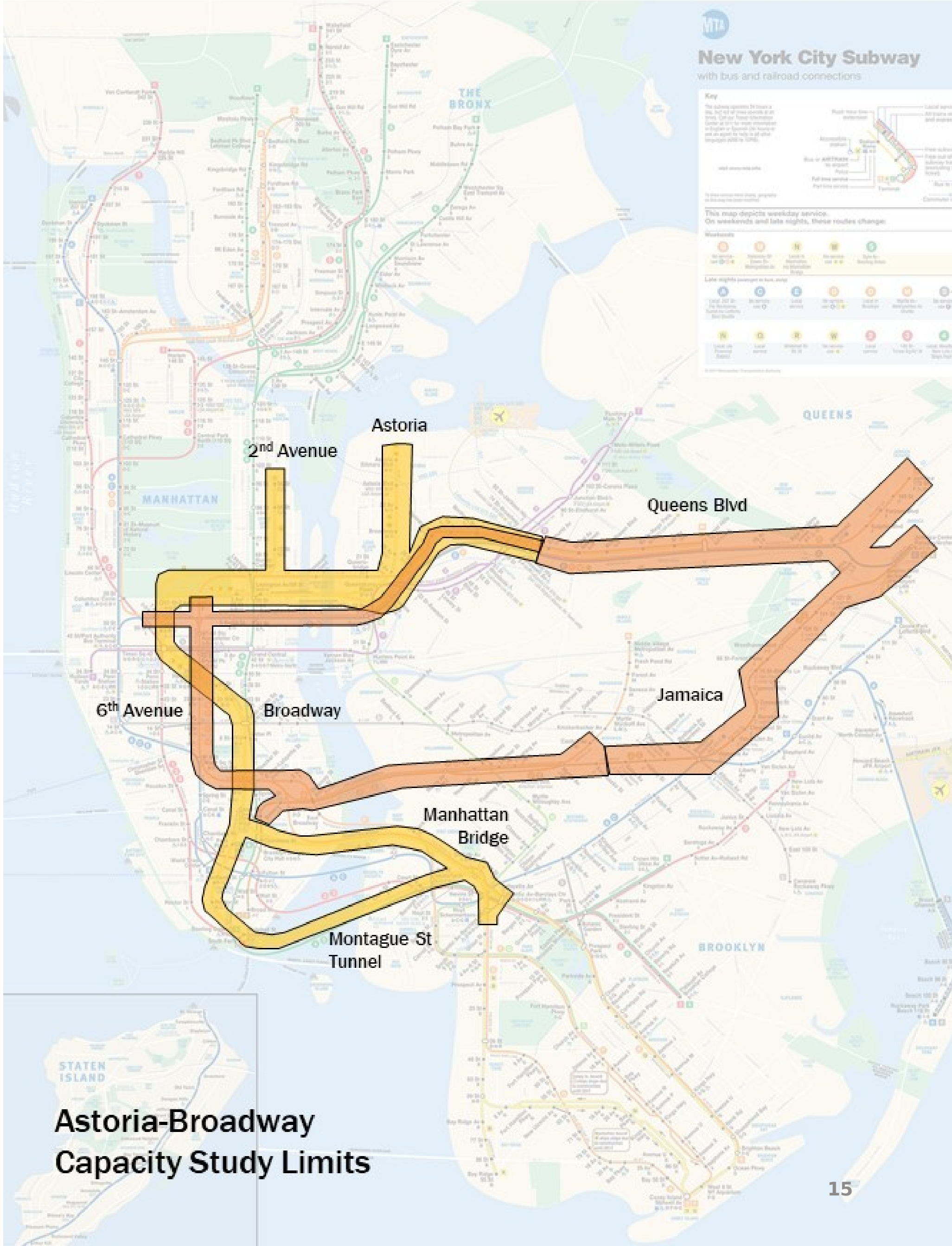
Interlockings and merges
- 34 St
- 11 St Cut

Traction power – Have not been fully quantified

Other areas that need to be studied – Fleet/support issues

Findings can help guide priorities in the Capital Program

- Future 2025-2029 MTA capital program
- Upgrades to stations
- Modernize signals to CBTC in potential future corridors:
    - 6th Avenue North
    - Astoria Line/60 St Tube
    - Broadway Line/DeKalb



Astoria-Broadway Capacity Study Limits

Potential operational improvements

Worth studying further:

- Turning select M trains from Forest Hills at 2 Av
- Restructuring Brighton and 4th Av service through DeKalb to reduce delays
- Terminating weekend M trains at Chambers St for customer convenience

Platforms at Chambers St.

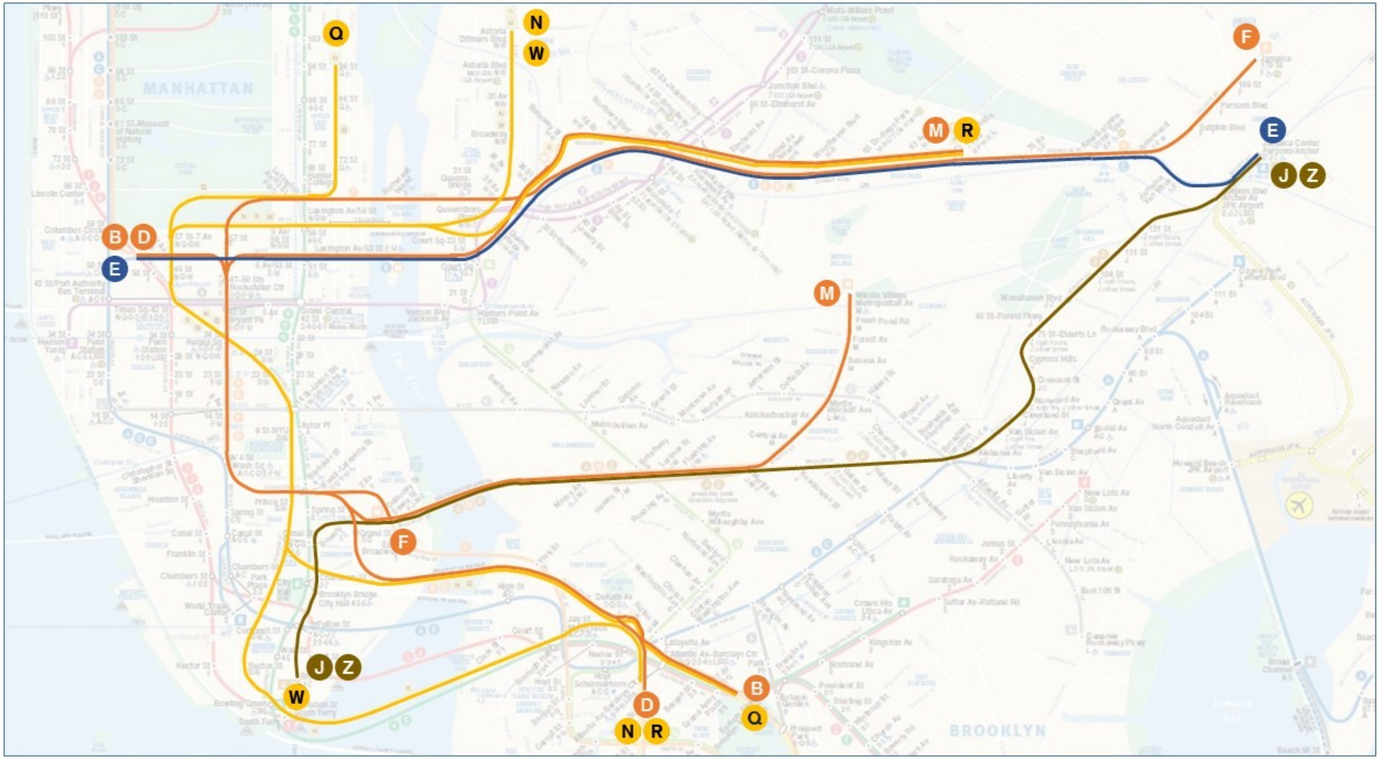
CBTC provides capacity gains

- Phased implementation of CBTC across the network will reduce congestion and provide capacity improvements.
- CBTC signaling mitigates the need for other costly capital improvements analyzed

Track work in association with CBTC installation on the 7 Line

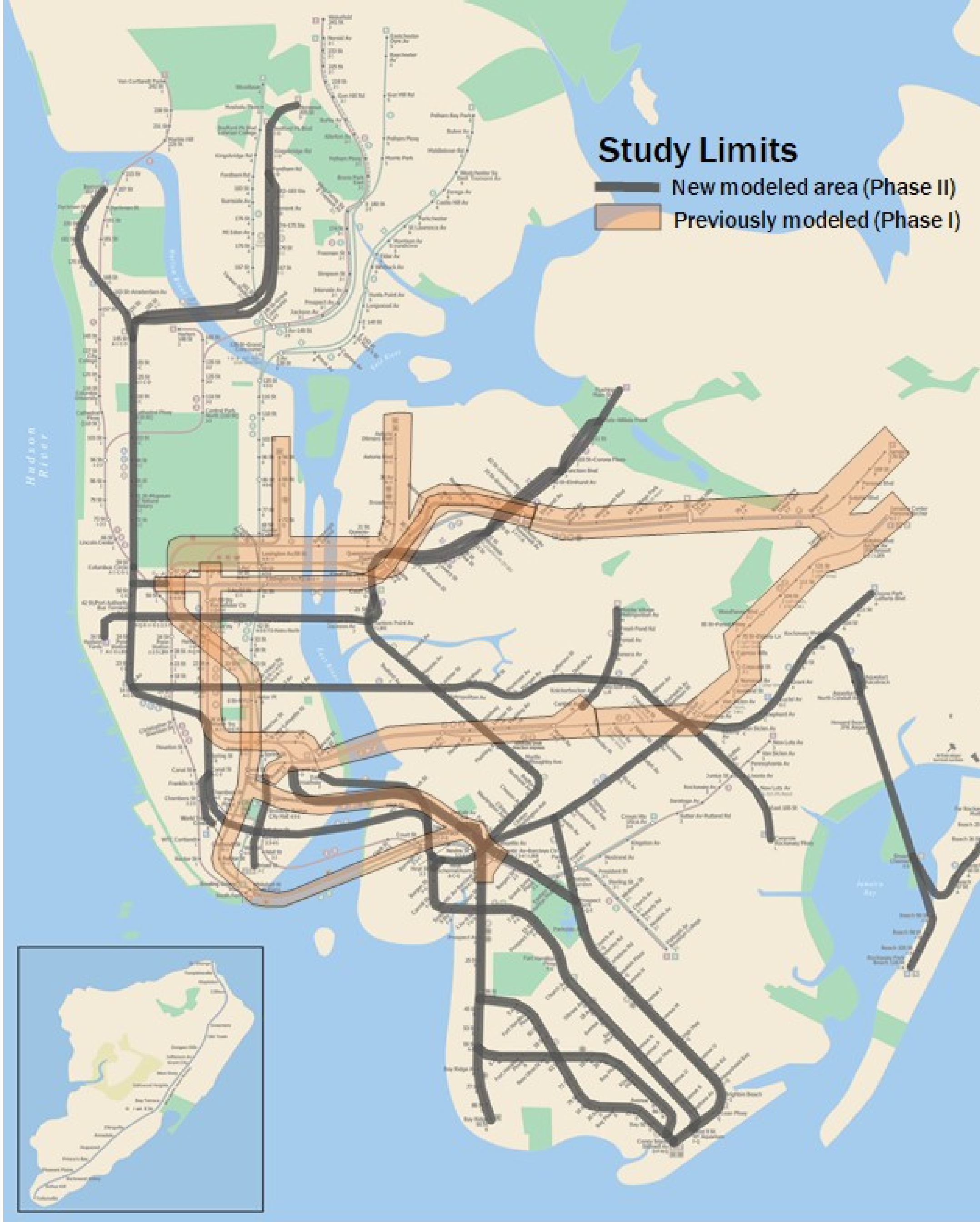
Findings

CBTC capacity gains on Broadway and 6th Av lines could provide increased service in the future on the BDFM and NQRW, important commuting services to Midtown and Lower Manhattan

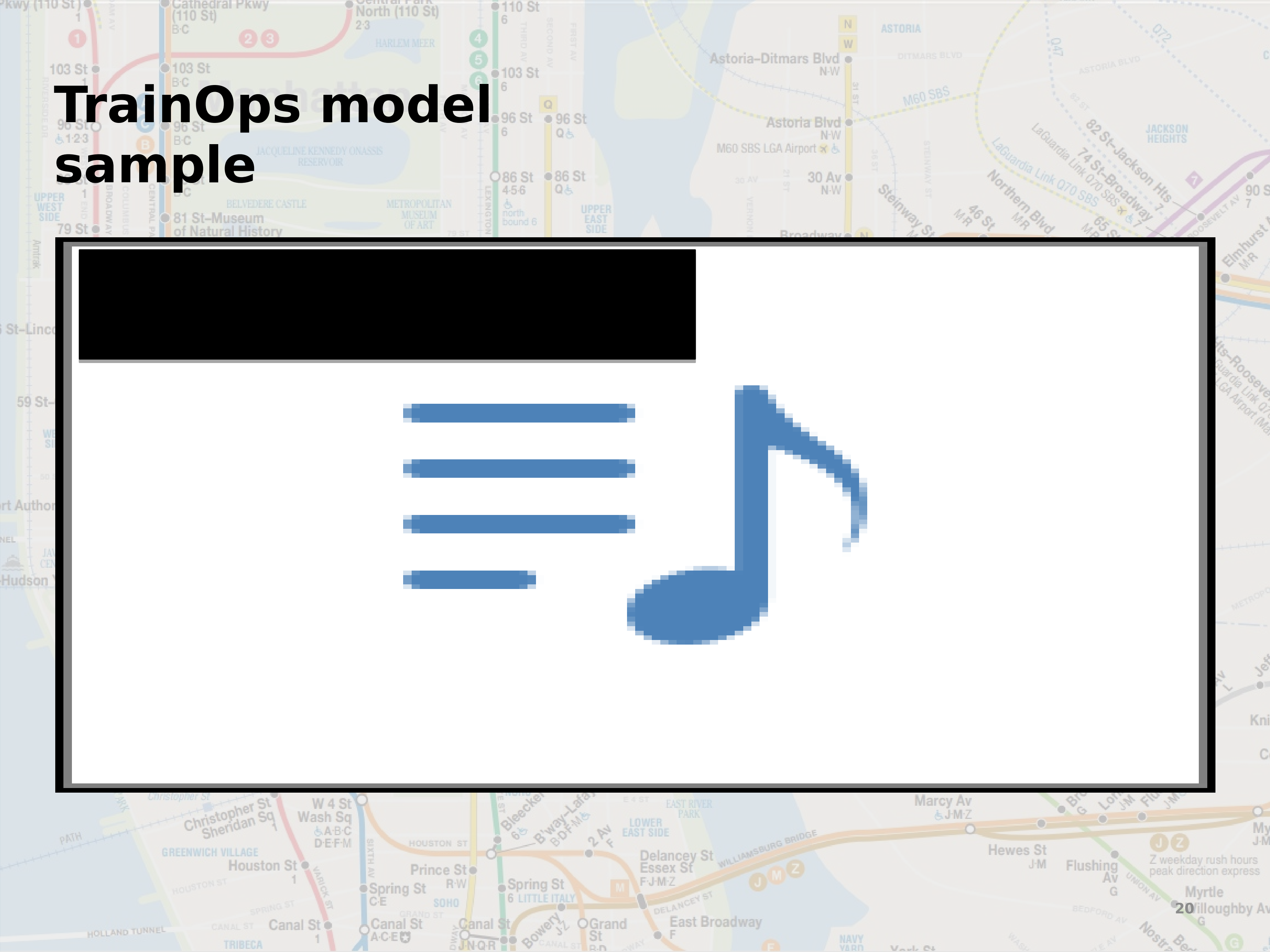


Model strengthens planning work

- Agency's model to be completed to include remaining B Division lines
- Used extensively for:
  - Service planning
  - Track work impact planning
  - Capital investment analyses
  - Ridership analysis



TrainOps model sample



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Questions?